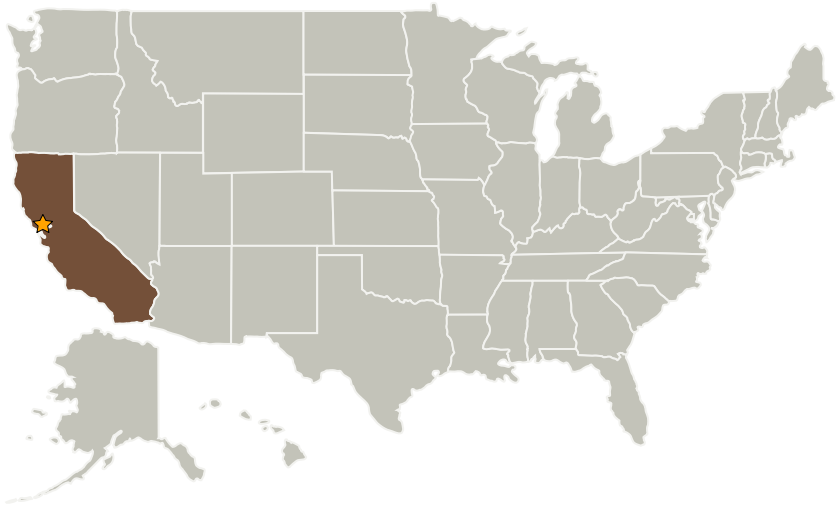
Miniature X-ray Source for Planetary Exploration Instruments, Phase II

Completed Technology Project (2008 - 2010)

Project Introduction

The objective of the proposed work is to develop a rugged, low power, passively cooled X-Ray source that is compatible with miniaturized XRD systems. The XRD instruments would be used for in situ measurements on planetary surfaces. This X-ray source will integrate an X-ray emitting vacuum tube and both low and high-voltage power supplies into a compact and lightweight unit. This X-ray source will enable further miniaturized X-ray instruments to be deployed for surface and subsurface exploration of the solar system. The objectives will be achieved with an X-ray source that combines the advantage of easy thermal management and simple control electronics. The concept relies on the use of state-of-the-art ceramic materials that combines very good electrical insulation properties with good thermal conductivity. This source will allow using the grounded-cathode geometry for simple and compact electronics, and rely on the heat-sinking properties of the electrical insulator for heat dissipation to ground. The most promising material for this application is Aluminum Nitride (AlN). Objective specifications for the source to be developed are as follows: Accelerating Voltage (25 kV), Electron Beam Current (200 uAmps), X-ray Spot Size (50 microns), X-ray Tube Dimensions (65 mm x 25 mm,lxd)

Primary U.S. Work Locations and Key Partners



Miniature X-ray Source for Planetary Exploration Instruments, Phase II

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Miniature X-ray Source for Planetary Exploration Instruments, Phase II

Completed Technology Project (2008 - 2010)

Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
inXitu, Inc.	Supporting Organization	Industry	Mountain View, California

Primary U.S. Work Locations
California

Project Transitions

February 2008: Project Start

February 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes